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(54) **INTERNAL COMBUSTION ENGINE WITH ELEVATED COMPRESSION RATIO AND MULTI-STAGE BOOSTING INCLUDING A VARIABLE-SPEED SUPERCHARGER**

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(58) **Field of Classification Search**

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See application file for complete search history.

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(57) **ABSTRACT**

An internal combustion engine includes a cylinder block that defines a cylinder and a cylinder head positioned relative to the cylinder block. A reciprocating piston is arranged inside the cylinder for compressing an air and fuel mixture at a geometric compression ratio of at least 10:1. A crankshaft is arranged in the cylinder block and rotated by the piston. An intake valve is operatively connected to the cylinder head and controls delivery of air to the cylinder for combustion therein. A mechanism provides late intake valve closing via constant peak lift of the intake valve over at least 5 degrees of crankshaft rotation. A multi-stage boosting system, having a turbocharger, a supercharger, and a continuously variable transmission for varying the supercharger's rotating speed, is regulated by a controller to selectively pressurize air being received from the ambient for delivery to the cylinder.

18 Claims, 8 Drawing Sheets